

# CHAPTER 3.0: WATER SUPPLY SYSTEM

## 3.1 CURRENT AND PLANNED WATER SUPPLIES

The City of La Habra currently has three sources of water supply:

- La Habra Basin (Idaho Street Well)
- Metropolitan Water District of Southern California (Metropolitan)
- California Domestic Water Company (CDWC)

### 3.1.1 La Habra Groundwater Basin

Production of groundwater is at a maximum rate within the limitations of the current operational facilities. However, with modifications to the Idaho Street Well, La Habra plans to double the pumping capacity from 1,200 to 2,400 acre–feet per year. Additional wells have been drilled; however, the water quality (TDS and Sodium) has prevented their use without treatment or blending.

### 3.1.2 California Domestic Water Company

Implementation of an upsizing project that is part of CDWC's ongoing Capital Improvement Program is likely to increase CDWC supply from 32,000 to 48,000 acre–feet per year (AFY). The project will increase the availability of additional water supply to La Habra, Brea, and the Southwest Suburban Water Company. The City of La Habra currently owns 1,945.25 shares of CDWC stock, and typically leases additional water rights on an annual basis. However, with the additional supply, the annual entitlement is expected to increase proportionately. La Habra's maximum available intake from CDWC is 7,500 AFY due to the constraints of the water system.

### 3.1.3 Metropolitan Water District of Southern California

The remainder of the water supply required to meet La Habra's demands is imported from Metropolitan via MWDOC. However, by implementing improvements to the Idaho Street Well and the CDWC supply system, La Habra is committed to reducing dependency on water imported from Metropolitan.

## 3.2 WATER SUPPLY PROJECTIONS

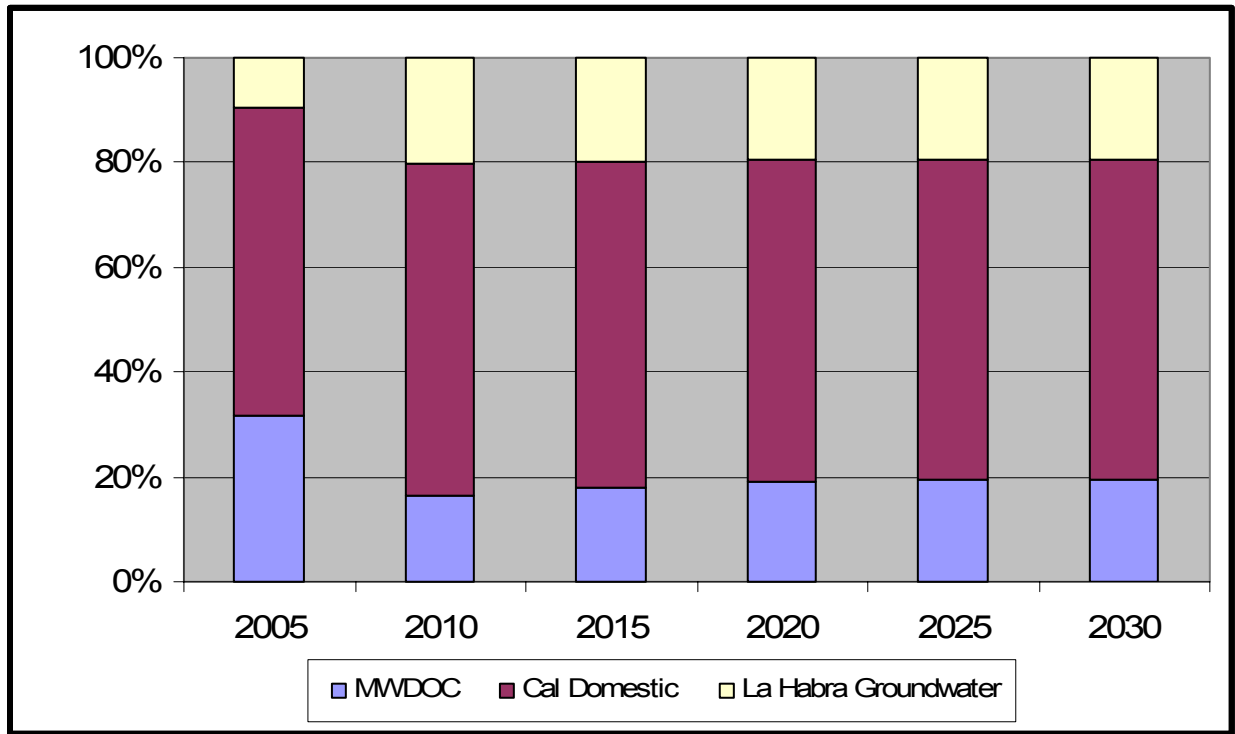
Projections of population and economic growth suggest that the City of La Habra may reach an ultimate population of 68,576 within the next 25 years, which is a moderate 9 percent increase. The number of dwelling units is not expected to increase dramatically; however, the increase in family size and intensification of land use by both industry and commercial entities can be attributed to the slight increase in population.

The La Habra community is expected to use 11,272 acre–feet of water in the year 2005, which is expected to steadily increase to 12,299 acre–feet of water by the year 2030. This projected use is likely to be less than regional averages due to a lack of large industrial users. The following table lists the projected supply for the next twenty–five years, in five–year increments:

Table 3.2 – 1: Current and Planned Water Supplies (AFY)						
Water Supply Sources:	2005	2010	2015	2020	2025	2030
Municipal Water District of Orange County	4,058	1,925	2,177	2,313	2,384	2,399
California Domestic Water Company	6,000	7,500	7,500	7,500	7,500	7,500
Supplier produced groundwater (La Habra Basin)	1,214	2,400	2,400	2,400	2,400	2,400
<b>Total</b>	<b>11,272</b>	<b>11,825</b>	<b>12,077</b>	<b>12,213</b>	<b>12,284</b>	<b>12,299</b>

### 3.2.1 Projected Water Supply Source Percentages

The sources providing the projected water needs are estimated to change from 59 percent California Domestic Water Company, 10 percent local groundwater production and the additional 32 percent Metropolitan Water District of Southern California, to 60, 20, and 20 percent, respectively. Figure 3.2 – 1: Projected Water Supply Sources, details the supply source percentages over the next twenty–five years, in five–year increments.



**Figure 3.2 – 1: Projected Water Supply Sources**

### 3.3 WATER SUPPLY HISTORY

The following table details the City of La Habra water supply for the past fifteen years:

Table 3.3 – 1: Water Production History by Source				
Fiscal Year Ending in June of	La Habra Basin	CDWC	MWDOC	Total Production
1991	1,812	5,117	2,261	9,190
1992	1,651	4,690	2,008	8,349
1993	1,084	5,784	1,896	8,764
1994	1,069	5,844	2,281	9,194
1995	1,553	6,156	1,666	9,375
1996	1,100	6,424	2,562	10,086
1997	47	6,448	3,991	10,486
1998	502	5,816	3,188	9,506
1999	1,132	6,510	2,353	9,995
2000	930	6,597	3,670	11,197
2001	1140	6,240	3,232	10,612
2002	1207	6,709	3,295	11,211
2003	534	6,090	4,167	10,791
2004	1346	5,941	3,776	11,063
2005	1214	5,894	3,309	10,417
<b>Average Annual Acre–Feet</b>	<b>1,088</b>	<b>6,017</b>	<b>2,910</b>	<b>10,016</b>
<b>Percentage</b>	<b>11%</b>	<b>60%</b>	<b>29%</b>	<b>100%</b>

### 3.3.1 Historical Water Supply Source Percentages

The historical water supply sources have an average annual distribution of 60 percent from CDWC, 11 percent from the La Habra Basin, and 29 percent from Metropolitan.

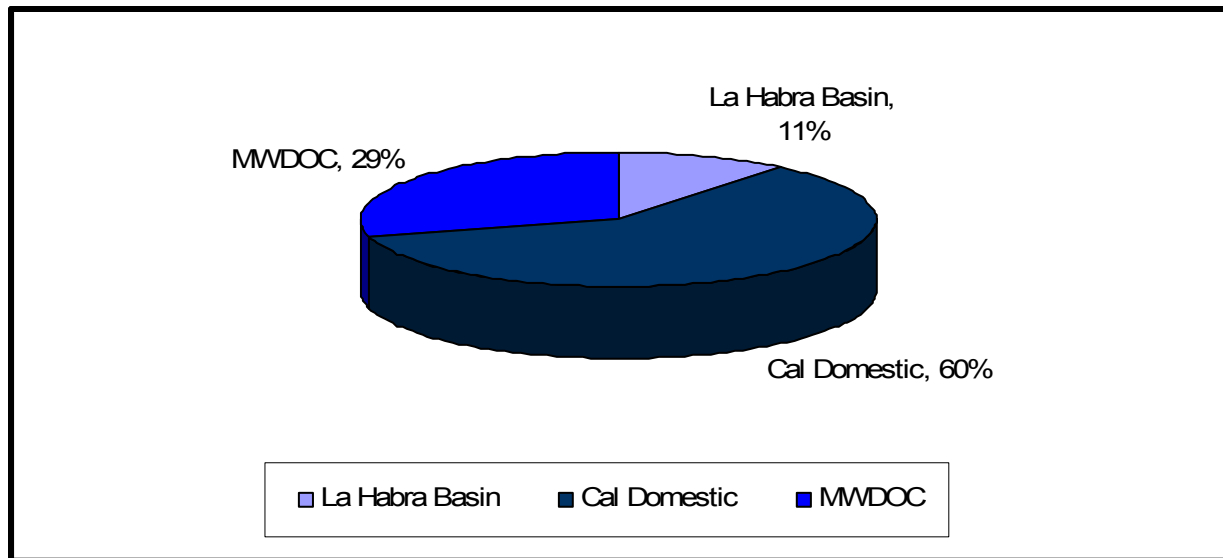


Figure 3.3 – 1: Historical Water Supply Sources

## **3.4 GROUNDWATER: LA HABRA BASIN**

### **3.4.1 Groundwater Exploration and Water Quality**

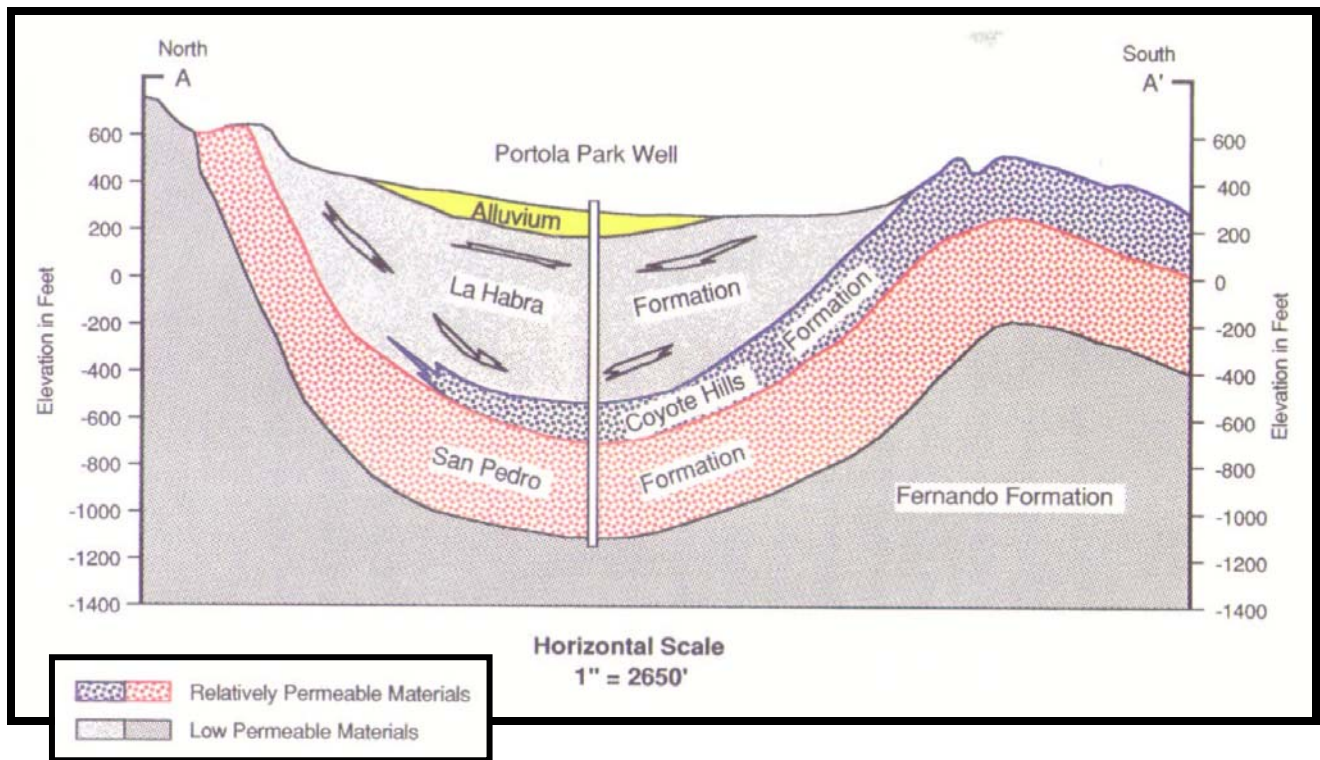
The City of La Habra extracts water from the non–adjudicated La Habra Basin. The estimated long–term extraction supply is 4,500 acre–feet per year; however, the historical La Habra extraction rate is approximately 1,074 acre–feet per year (averaged over the past 15 years), which is considerably less than the potential yield. Thus, the La Habra Basin has not been identified to be in overdraft. In fact, La Habra plans to utilize the additional groundwater supply by increasing the capacity of the existing Idaho Street Well.

In 1977 La Habra commenced an exploration program for local groundwater production, in which three test wells were drilled. Only one test well was considered satisfactory to complete implementation of production facilities. This well was placed into service in 1984 and continued service until it collapsed in January of 1997. In August that same year, the Department of Health Services, Drinking Water Field Operation Branch, Santa Ana District approved the well construction plans for the Idaho Street Well, which is located 30 feet southwest of the original well. The Idaho Street Well is currently the only production of potable domestic water within the boundaries of La Habra.

Additionally, in December of 1994 the City Council authorized the drilling of two new wells, (one test well and one production well). Initial water quality tests indicated that the water produced by these wells was not suitable for potable usage (high sodium and TDS). As a result, La Habra gave consideration to treatment and blending for potable use and/or blending for irrigation purposes. After analysis, these alternatives were not considered cost–effective.

### **3.4.2 La Habra Groundwater Basin Geology**

From a structural geology standpoint, the La Habra Basin area is dominated by the northwest trending La Habra Syncline (a U–shaped down–fold) which is bounded on the north by the Puente Hills and on the south by the Coyote Hills. The fold is a naturally occurring trough, or valley, where significant quantities of groundwater have accumulated over the past 150,000 years. The La Habra groundwater basin consists of four major formations, which include bearing zones or aquifer units. These are the Alluvium, the La Habra Formation, the Coyote Hills Formation, and the San Pedro Formation, all illustrated on the following cross–section.



**Figure 3.4 – 1: La Habra Basin Cross-Section**

The Alluvium is found along the surface stream courses and is composed of unconsolidated silt, clay, sand, and gravel. Alluvium thickness ranges from a few feet to over 100 feet.

The La Habra Formation lies below the Alluvium, but it can be seen where it is uplifted and exposed in both the Coyote Hills and in the Puente Hills. The La Habra Formation consists of mudstone, siltstone, sandstone, and conglomerate. It ranges in thickness from 300 to nearly 1,200 feet. Water levels of wells in the La Habra Formation have been measured between 100 and 200 feet below ground surface across the La Habra Basin area.

Immediately underneath the La Habra Formation lies the Coyote Hills Formation. The Coyote Hills Formation is made up of mudstone interbedded with sandstone and pebbly conglomerate, which are 300 to 1,200 feet thick. Water levels in wells of the Coyote Hills Formation have been measured at about 120 feet below the ground surface.

The deepest water bearing unit is the San Pedro formation. The San Pedro formation is comprised of cemented and non-cemented sands, silty sandstone, sandy conglomerate, and pebbly conglomerates. The San Pedro Formation ranges between 200 and 400 feet in thickness and produces the best quality groundwater of all the water bearing zones. Pressure levels of confined groundwater in wells of the San Pedro aquifer zone range from about 100 to 200 feet below ground surface.

### **3.4.3 Extraction Rate, Groundwater Recharge, and Expected Yield**

From 1922 to the early 1940's water levels in the La Habra Basin declined markedly because of increased water extraction and deficient rainfall. Water levels rose in the mid 1940's and then declined again in the late 1940's reaching the lowest recorded levels in the middle to late 1950's. From 1960 to 1977, water levels increased in elevation because of a significant decrease in water extraction. Based upon recorded stream run-off yields, it is estimated that approximately 2,100 acre-feet of water would percolate during the average year. For direct percolation of rainfall and resulting run-off within the valley itself, it is estimated that an average of 1,600 acre – feet annually would percolate. Thus, the groundwater recharge is estimated at approximately 3,700 acre-feet per year. Subsurface flow estimates are about 5,500 acre-feet annually. Therefore, it is estimated that the average long-term supply that can be extracted without severe or sustained changes in the amount of groundwater in storage, is approximately 4,500 acre-feet (an average of the two values). Current groundwater production by La Habra at the Idaho Street Well generates approximately 1,200 acre-feet per year, which is only about 25 percent of its potential yield. Additional development of groundwater resources could significantly increase the available water supply for La Habra. Full development of the La Habra Basin could eventually supply up to 40 percent of La Habra's current water demands.

La Habra currently plans to double the production capacity for the Idaho Street Well from 1,200 to 2,400 acre-feet per year, which will increase reliance on local sources from 11 to 22 percent of total demands. Details regarding this project are provided in Chapter 7.0: Water Projects and Programs.



### 3.4.5 Historical La Habra Groundwater Basin Extraction

Table 3.4 – 1 details the history of the water extracted from the La Habra Groundwater Basin.

Table 3.4 – 1: Historical Groundwater Extraction	
Fiscal Year Ending in June of	Acre–Feet
1984	155
1985	807
1986	1,279
1987	706
1988	1,238
1989	1,061
1990	1,212
1991	1,812
1992	1,651
1993	1,084
1994	1,069
1995	1,553
1996	1,100
1997	47
1998	502
1999	1,132
2000	930
2001	1,140
2002	1,207
2003	534
2004	1,346
2005	1,214

\*1986 – 87 production down due to major well modifications.

\*1996 – 97 Well No. 2 collapsed.

### 3.5 WHOLESALE WATER – CALIFORNIA DOMESTIC WATER COMPANY

The California Domestic Water Company provides groundwater from the Main San Gabriel Basin to each of its member agencies, including the City of La Habra. The maximum available water to La Habra from CDWC totals 7,200 AFY. Each member agency receives a prescribed entitlement to water based upon the number of shares owned and the safe yield of the Main San Gabriel Basin. The City of La Habra currently owns 1,945.25 shares of CDWC stock. Additionally, La Habra consistently leases and contracts additional water rights. The member agency entitlement criterion per share varies year by year, based on CDWC's allotted percentage and the safe yield of the Main San Gabriel Basin. Historically this has been about 1.38 to 1.85 acre–feet per share.

The voluntary adjudication of the Main San Gabriel Water Basin provided CDWC 5.60 percent of the basin's safe yield (with purchased water rights totaling 6.11 percent). The annual basin safe yield is established by the court approved Water Master based upon engineering studies. The adjudication of basin water rights followed settlement, effective October 1, 1963, of the suit brought by the cities of Long Beach, Compton, and the Central Basin Municipal Water District in 1959 against the major producers in the Upper San Gabriel Basin.

#### 3.5.1 Historical California Domestic Water Company Purchases

The following table details the history of the water purchased from the California Domestic Water Company (including leased water rights):

Table 3.5 – 1: Historical California Domestic Water Company Water Purchases	
Fiscal Year Ending in June of	Purchased Water (Acre–Feet)
1972	3,308
1973	2,854
1974	2,183
1975	2,926
1976	2,944
1977	3,138
1978	3,003

**Table 3.5 – 1: Historical California Domestic Water Company  
Water Purchases**

<b>Fiscal Year Ending in June of</b>	<b>Purchased Water (Acre–Feet)</b>
1979	2,879
1980	2,842
1981	2,788
1982	2,831
1983	2,545
1984	4,170
1985	5,309
1986	4,992
1987	5,251
1988	4,792
1989	5,136
1990	5,294
1991	5,117
1992	4,690
1993	5,784
1994	5,844
1995	6,156
1996	6,424
1997	6,448
1998	5,816
1999	6,510
2000	6,597
2001	6,240
2002	6,709
2003	6,090
2004	5,940
2005	5,894

### 3.6 WHOLESALE WATER – MUNICIPAL WATER DISTRICT OF ORANGE COUNTY

In the 1920's, three cities in Orange County (Anaheim, Fullerton, and Santa Ana), along with ten cities in Los Angeles County (Los Angeles, Long Beach, Santa Monica, Burbank, Glendale, Pasadena, San Fernando, Compton, Beverly Hills, and Torrance) formed the Metropolitan Water District of Southern California (Metropolitan).

In 1951 MWDOC was formed by Orange County voters for the purpose of annexing to Metropolitan in order to acquire supplemental water supplies. The acquisition of additional water supplies was necessary for the continued economic growth of these cities. Subsequent annexations to MWDOC have brought the total population within the agency to approximately 82 percent of the County's total population.

Thirty member agencies purchase water from MWDOC for municipal, industrial, agricultural, and groundwater replenishment purposes.

**Table 3.6 – 1: MWDOC Member Agencies**

City of Brea	El Toro Water District
City of Buena Park	City of San Clemente
City of Fountain Valley	Irvine Ranch Water District
City of Garden Grove	Laguna Beach County Water District
City of Huntington Beach	Mesa Consolidated Water District
City of La Habra	Moulton Niguel Water District
City of La Palma	Orange County Water District
City of Orange	Santa Margarita Water District
City of Seal Beach	Santiago County Water District
City of Tustin	Serrano Water District
City of Westminster	Southern California Water Company
City of Newport Beach	Trabuco Canyon Water District
City of San Juan Capistrano	Yorba Linda Water District
East Orange County Water District	Emerald Bay Service District
South Coast Water District	Orange Park Acres Mutual Water Company

In 1954 the City of La Habra, together with the City of Brea, constructed a twenty inch water transmission line from Metropolitan's Orange County Feeder (just south of the Orange County Reservoir) with a maximum capacity of 5,500 gallons per minute (GPM). This connection was designated Orange County-4 (OC-4). La Habra is the primary stakeholder for this line; however, the City of Brea and the Collier Chemical Company have capacity rights. In 1955 the City of La Habra constructed its second facility for taking Metropolitan water on the Lower Feeder; this connection is designated as Orange County-45 (OC-45) with a capacity of 5,400 GPM. A second turnout on the Lower Feeder was also provided but it was relinquished to the La Habra Heights County Water District.

### 3.6.1 Historical Metropolitan Water District Water Purchases

The following table details the history of the water purchased from Metropolitan.

<b>Table 3.6 – 2: Historical Metropolitan Water District Water Purchases</b>	
<b>Year</b>	<b>Purchased Water (Acre-Feet)</b>
1954	332
1955	774
1956	1,075
1957	1,515
1958	2,299
1959	2,877
1960	3,225
1961	3,420
1962	1,911
1963	1,469
1964	2,387
1965	2,346
1966	2,783
1967	2,828
1968	3,304
1969	3,867

**Table 3.6 – 2: Historical Metropolitan Water District  
Water Purchases**

<b>Fiscal Year Ending in June of</b>	<b>Purchased Water (Acre–Feet)</b>
1971	4,551
1972	4,817
1973	4,913
1974	5,580
1975	5,811
1976	5,935
1977	5,653
1978	6,245
1979	6,017
1980	5,866
1981	6,800
1982	5,868
1983	5,921
1984	4,942
1985	3,873
1986	3,429
1987	3,643
1988	3,643
1989	3,487
1990	3,149
1991	2,261
1992	2,008
1993	1,896
1994	2,281
1995	1,666
1996	2,562
1997	3,991
1998	3,188
1999	2,353

Table 3.6 – 2: Historical Metropolitan Water District Water Purchases	
Fiscal Year Ending in June of	Purchased Water (Acre–Feet)
2000	3,670
2001	3,233
2002	3,294
2003	4,167
2004	3,776
2005	3,310

### 3.7 RELIABILITY OF SUPPLY

MWDOC is implementing water supply alternative strategies for the region and on behalf of their member agencies to ensure available water in the future. These strategies are identified in the MWDOC 2005 Regional UWMP. The optimum water supply strategy attempts to meet the following objectives:

- Ensure that water is available for Orange County residents and businesses in the future,
- Minimize the consumers water supply cost,
- Use a variety of sources, and
- Provide flexibility to allow MWDOC to quickly take advantage of changing and new markets, if and when they develop.

#### 3.7.1 Basis of Water Year Data

According to the Department of Water Resources Guidebook, water years are defined by the pattern and level of annual runoff for each watershed from which a supplier receives supplies. Since La Habra receives its water supply both locally (from the La Habra Groundwater Basin and the Main San Gabriel Basin via CDWC) and remotely (from Metropolitan), water years based on the historical hydrology of both regions were evaluated. Supply reliability projections were calculated by comparing the historical hydrology for both regions with current and projected water demands. The set that yielded the most conservative projections was used.

Approximately 78 percent of La Habra's water supply is obtained from local sources (La Habra Groundwater Basin and the Main San Gabriel Basin via CDWC). Thus, the hydrology of the region encompassing the groundwater basins was researched to determine the regional water year basis. The research determined that the single-driest hydrologic year occurred in 1961, with 1959 to 1961 being the multiple-driest hydrologic years to date. The normal water year data was calculated as an average of historical regional hydrology from 1922 to 2004.

In addition, 22 percent of La Habra's supply is imported from Metropolitan, which determines water year data based on the hydrologic history of the State Water Project and the Colorado River Aqueduct regions. Metropolitan determined that the single-driest hydrologic year occurred in 1977, with 1990 to 1992 being the multiple-driest hydrologic years to date. The normal water year data was calculated as an average of the historical hydrology of the State Water Project and the Colorado River Aqueduct from 1922 to 2004.



Water supply projections yielded over 100 percent supply reliability for both sets of data during normal, single, and multiple–dry years. However, the data used in this UWMP is based on the local hydrology since the driest hydrologic condition is derived from the local region and yields a more conservative projection.

Table 3.7 – 1: Basis of Water Year Data			
Water Year Type			
Normal Water Year	Average of Historical Hydrology from 1922 to 2004		
Single–Dry Water Year	1961		
Multiple–Dry Water Years	1959	1960	1961

### 3.7.2 Supply Reliability Analysis

The following tables evaluate the reliability of the water supply during normal, single–dry, and multiple–dry water years. The basis for the evaluation is taken from the local water supply available during historical dry years. The single–driest hydrologic year to date was 1961 and the multiple–driest years were found to be 1950 to 1961. The water supply available during these years was compared to demand projections for the years 2010, 2015, 2020, and 2025. The analysis indicates that the reliability of the water supply is over 100%, which seems counterintuitive. However, this supply reliability is attributed to additional reserves that Metropolitan will utilize to supplement normal sources of water supply during dry years.

Table 3.7 – 2: Supply Reliability – 2005 - 2010 (AFY)					
2010 Basis for Evaluation	Normal Water Year	Single– Dry Year (1961)	Multiple–Dry Water Years		
			Year 1 (1959)	Year 2 (1960)	Year 3 (1961)
CDWC	7,500	7,500	7,500	7,500	7,500
La Habra Groundwater Basin	2,400	2,400	2,400	2,400	2,400
	% of Normal	100.0%	93.4%	95.9%	97.0%
MWDOC	1,925	2,881	3,153	2,687	2,881
	% of Normal	149.7%	163.8%	139.6%	149.7%

Table 3.7 – 3: Supply Reliability – 2010 - 2015 (AFY)					
2015	Normal	Single–	Multiple–Dry Water Years		
Basis for Evaluation	Water Year	Dry Year (1961)	Year 1 (1959)	Year 2 (1960)	Year 3 (1961)
CDWC	7,500	7,500	7,500	7,500	7,500
La Habra Groundwater Basin	2,400	2,400	2,400	2,400	2,400
	% of Normal	100.0%	100.0%	100.0%	100.0%
MWDOC	2,177	3,147	3,187	2,883	3,147
	% of Normal	144.6%	146.4%	132.4%	144.6%

Table 3.7 – 4: Supply Reliability – 2015 - 2020 (AFY)					
2020	Normal	Single–	Multiple–Dry Water Years		
Basis for Evaluation	Water Year	Dry Year (1961)	Year 1 (1959)	Year 2 (1960)	Year 3 (1961)
CDWC	7,500	7,500	7,500	7,500	7,500
La Habra Groundwater Basin	2,400	2,400	2,400	2,400	2,400
	% of Normal	100.0%	100.0%	100.0%	100.0%
MWDOC	2,313	3,291	3,378	3,043	3,291
	% of Normal	142.3%	146.0%	131.5%	142.3%

Table 3.7 – 5: Supply Reliability – 2020 - 2025 (AFY)					
2025	Normal	Single–	Multiple–Dry Water Years		
Basis for Evaluation	Water Year	Dry Year (1961)	Year 1 (1959)	Year 2 (1960)	Year 3 (1961)
CDWC	7,500	7,500	7,500	7,500	7,500
La Habra Groundwater Basin	2,400	2,400	2,400	2,400	2,400
	% of Normal	100.0%	100.0%	100.0%	100.0%
MWDOC	2,384	3,365	3,481	3,129	3,365
	% of Normal	141.2%	146.0%	131.3%	141.2%

**Table 3.7 – 6: Supply Reliability – 2025 - 2030 (AFY)**

2030 Basis for Evaluation	Normal Water Year	Single– Dry Year (1961)	Multiple–Dry Water Years		
			Year 1 (1959)	Year 2 (1960)	Year 3 (1961)
CDWC	7,500	7,500	7,500	7,500	7,500
La Habra Groundwater Basin	2,400	2,400	2,400	2,400	2,400
	% of Normal	100.0%	100.0%	100.0%	100.0%
MWDOC	2,399	3,381	3,517	3,152	3,381
	% of Normal	141.0%	146.6%	131.4%	141.0%

### 3.8 SUPPLY INCONSISTENCY FACTORS

The following table summarizes the factors that result in the inconsistency of each source of La Habra's water supply.

Table 3.8 – 1: Factors Resulting in Inconsistency of Supply				
Name of supply	Legal	Environmental	Water Quality	Climatic
Metropolitan Water District of Southern California				x
California Domestic Water Company				x
La Habra Groundwater Basin				X

#### 3.8.1 Climatic Factors

La Habra is located in a valley between the Puente Hills and the West Coyote Hills, and is located approximately 20 miles southeast of Los Angeles. The average temperature ranges from 48 to 74 degrees, while average annual rainfall is 12.6 inches. The usually mild climatological pattern is interrupted infrequently by periods of extremely hot weather, winter storms, or Santa Ana winds.

Climatological data in California has been recorded since the year 1858. During this interval, California has experienced three periods of severe drought: 1928–34, 1976–77 and 1987–91. The year 1961 is considered to be the driest year of record within the Orange County region. Southern California and, in particular, the City of La Habra has sustained few adverse impacts from these drought periods, due in large part to the availability of Colorado River water and groundwater stored in the La Habra and Main San Gabriel basin.

As a result of the interval periods of drought, the City of La Habra is vulnerable to water shortages due to its climatic environment and seasonally hot summer months. Response to a future drought would follow the water use efficiency mandates of MWDOC and its support of the Metropolitan Water Surplus and Drought Management (WSDM) Plan, along with implementation of La Habra's Water Shortage Contingency Plan (Chapter 8).

### 3.9 TRANSFER AND EXCHANGE OPPORTUNITIES

Transfer and exchange opportunities are detailed on a regional level as part of the MWDOC Regional UWMP. However, on a local level, the City of La Habra continues to seek additional entitlement to the CDWC supply. In the past, La Habra Heights County Water District, Lowell Unified School District, and other shareholders of CDWC have leased their annual water year entitlement to La Habra.

MWDOC is currently developing long – term relationships with water suppliers, which may result in transfer agreements in the near future. Possible agreements include, for example, the transfer of water from the South Feather Water and Power Agency (SFWPA) in Northern California to MWDOC's service area and the purchase of recycled water from the City of Long Beach. MWDOC will continue to assist member agencies, including La Habra, to develop transfer and exchange opportunities outside of the MWDOC region.